



Billing Code 4910-13

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA-2018-0228; Special Conditions No. 25-719-SC]

Special Conditions: Bombardier Inc. BD-700-2A12 and BD-700-2A13 Airplane; Flight-Envelope Protection: General Limiting Requirements

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final special conditions; request for comments.

SUMMARY: These special conditions are issued for the Bombardier Inc. (Bombardier) Model BD-700-2A12 and BD-700-2A13 airplanes. These airplanes will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for transport-category airplanes. This design feature is a new control architecture and a full digital-flight-control system that provides comprehensive flight-envelope protections. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: This action is effective on Bombardier Inc. on **[INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. Send your comments by **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: Send comments identified by docket number FAA-2018-0228 using any of the following methods:

- *Federal eRegulations Portal:* Go to <http://www.regulations.gov/> and follow the online instructions for sending your comments electronically.
- *Mail:* Send comments to Docket Operations, M-30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue, SE., Room W12-140, West Building Ground Floor, Washington, DC, 20590-0001.
- *Hand Delivery or Courier:* Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE. Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
- *Fax:* Fax comments to Docket Operations at 202-493-2251.

Privacy: The FAA will post all comments it receives, without change, to <http://www.regulations.gov/>, including any personal information the commenter provides. Using the search function of the docket Web site, anyone can find and read the electronic form of all comments received into any FAA docket, including the name of the individual sending the comment (or signing the comment for an association, business, labor union, etc.). DOT's complete Privacy Act Statement can be found in the **Federal Register** published on April 11, 2000 (65 FR 19477-19478).

Docket: Background documents or comments received may be read at <http://www.regulations.gov/> at any time. Follow the online instructions for accessing the docket or go to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Joe Jacobsen, FAA, Airplane and Flight Crew Interface Section, AIR-671, Transport Standards Branch, Policy and Innovation Division, Aircraft Certification Service, 2200 S. 216th St., Des Moines, Washington 98198-6547; telephone 206-231-3158; facsimile 425-231-3398.

SUPPLEMENTARY INFORMATION: The substance of these special conditions has been published in the **Federal Register** for public comment in several prior instances with no substantive comments received. Therefore, the FAA has determined that prior public notice and comment are unnecessary, and finds that, for the same reason, good cause exists for adopting these special conditions upon publication in the **Federal Register**.

Comments Invited

We invite interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

We will consider all comments we receive by the closing date for comments. We may change these special conditions based on the comments we receive.

Background

On May 30, 2012, Bombardier applied for an amendment to Type Certificate No. T00003NY to include the new BD-700-2A12 and BD-700-2A13 airplanes. The Model BD-700-2A12 and BD-700-2A13 airplanes, which are derivatives of the BD-700 series airplane currently approved under Type Certificate No. T00003NY. The Model BD-700-2A12 and BD-700-2A13 airplanes augment the existing BD-700 family of airplanes and are marketed as the Bombardier Global 7000 and Global 8000 airplanes, respectively. These are business jets with a maximum

certified passenger capacity of 19. The Model BD-700-2A12 and BD-700-2A13 airplanes will have a maximum takeoff weight of 106,250 lbs. and 104,800 lbs., respectively.

Type Certification Basis

Under the provisions of title 14, Code of Federal Regulations (14 CFR) 21.101, Bombardier must show that the Model BD-700-2A12 and BD-700-2A13 airplanes meet the applicable provisions of the regulations listed in Type Certificate No. T00003NY or the applicable regulations in effect on the date of application for the change except for earlier amendments as agreed upon by the FAA.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for the Model BD-700-2A12 and BD-700-2A13 airplanes because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, or should any other model already included on the same type certificate be modified to incorporate the same novel or unusual design feature, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the Model BD-700-2A12 and BD-700-2A13 airplanes must comply with the fuel-vent and exhaust-emission requirements of 14 CFR part 34 and the noise-certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.101.

Novel or Unusual Design Features

The Bombardier Model BD-700-2A12 and BD-700-2A13 airplanes will incorporate the following novel or unusual design feature: New control architecture and a full digital-flight-control system that provides comprehensive flight-envelope protections.

Discussion

The applicable airworthiness regulation is 14 CFR 25.143. The purpose of § 25.143 is to verify that any operational maneuvers conducted within the operational envelope can be accomplished smoothly with average piloting skill and without exceeding any structural limits. The pilot should be able to predict the airplane response to any control input. During the course of the flight test program, the pilot determines compliance with § 25.143 primarily through qualitative methods. During flight test, the pilot should evaluate all of the following:

- The interface between each protection function;
- Transitions from one mode to another;
- Airplane response to intentional dynamic maneuvering, whenever applicable, through dedicated maneuvers;
- General controllability assessment;
- High speed characteristics; and
- High angle-of-attack.

Section 25.143, however, does not adequately ensure that the novel or unusual features of the BD-700 series airplanes will have a level of safety equivalent to that of existing standards. These special conditions are therefore required to accommodate the flight envelope limiting systems in

the BD-700 series airplanes. The general limiting requirements are necessary to ensure a smooth transition from normal flight to the protection mode and adequate maneuver capability. The general limiting requirements also ensure that the structural limits of the airplane are not exceeded. Furthermore, failure of the flight-envelope protection feature must not create hazardous flight conditions. The additional safety standards in these special conditions will ensure a level of safety equivalent to that of existing standards.

Applicability

As discussed above, these special conditions are applicable to the Bombardier Model BD-700-2A12 and BD-700-2A13 airplanes. Should Bombardier apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, these special conditions would apply to that model as well.

Conclusion

This action affects only certain novel or unusual design features on Bombardier Model BD-700-2A12 and BD-700-2A13 airplanes. It is not a rule of general applicability.

List of Subjects in 14 CFR Part 25

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(f), 106(g), 40113, 44701, 44702, 44704.

The Special Conditions

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Bombardier Model BD-700-2A12 and BD-700-2A13 airplanes.

General Limiting Requirements:

- a. Onset characteristics of each envelope protection feature must be smooth, appropriate to the phase of flight and type of maneuver, and not in conflict with the ability of the pilot to satisfactorily change airplane flight path, speed, or attitude as needed.
- b. Limit values of protected flight parameters (and if applicable, associated warning thresholds) must be compatible with the following:
 - i. Airplane structural limits,
 - ii. Required safe and controllable maneuvering of the airplane, and
 - iii. Margins to critical conditions. Unsafe flight characteristics/conditions must not result if dynamic maneuvering, airframe and system tolerances (both manufacturing and in-service), and non-steady atmospheric conditions, in any appropriate combination and phase of flight, can produce a limited flight parameter beyond the nominal design-limit value.
- c. The airplane must be responsive to intentional dynamic maneuvering to within a suitable range of the parameter limit. Dynamic characteristics such as damping and overshoot must also be appropriate for the flight maneuver and limit parameter in question.
- d. When simultaneous envelope limiting is engaged, adverse coupling or adverse priority must not result.

Failure States:

- a. Electronic flight-control-system failures (including sensors) must not result in a condition where a parameter is limited to such a reduced value that safe and controllable maneuvering is no longer available.
- b. The crew must be alerted by suitable means if any change in envelope limiting or maneuverability is produced by single or multiple failures of the electronic flight-control system not shown to be extremely improbable.

Issued in Des Moines, Washington, on March 15, 2018.

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